

**What is claimed is:**

1. A compound comprising:
  - (a) an amorphous copolymer including interpolymerized units derived from one or more  
5 perfluorinated ethers of the formula:  
 $\text{CF}_2=\text{CFO}-(\text{CF}_2)_m-(\text{O}(\text{CF}_2)_p)_n-\text{OR}_f$  (Formula I) wherein  $\text{R}_f$  is a perfluorinated (C1 -C4)alkyl group,  $m=1-4$ ,  $n=0-6$ , and  $p=1-2$ , or  
 $\text{CF}_2=\text{CF}(\text{CF}_2)_m-\text{O}-\text{R}_f$  (Formula II) wherein:  $m=1-4$ ;  $\text{R}_f$  is a perfluorinated aliphatic group optionally containing O atoms; and
  - 10 (b) a curable component including at least one filler having at least 10 parts per 100 parts of component (a), such that upon vulcanization the resulting compound has a Shore A hardness according to ASTM D2240 of 60 or greater, a TR-10 of  $-25^\circ\text{C}$  or less, and a permeation rate of  $65\text{ (g}\cdot\text{mm/m}^2\cdot\text{day)}$  or less.
- 15 2. The compound according to claim 1, wherein said compound includes terpolymers or quadpolymers.
3. The compound according to claim 1, wherein said copolymer includes vinylidene fluoride, tetrafluoroethylene, hexafluoro propylene, vinyl ethers, chloro trifluoro ethylene,  
20 pentafluoropropylene, vinyl fluoride, propylene, ethylene or combinations thereof.
4. The compound according to claim 1, wherein said compound is derived from ethylenically unsaturated monomers of the formula  $\text{CF}_2=\text{CFR}_f$  where  $\text{R}_f$  is fluorine or perfluoroalkyl of 1 to 8 carbon atoms.  
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5. The compound according to claim 1, further comprising an effective amount of cure site moieties derived from one or more compounds of the formula: a)  $\text{CX}_2=\text{CX}(\text{Z})$ , wherein: (i) X is H or F; and (ii) Z is Br, I, Cl or  $\text{R}_f\text{U}$  wherein  $\text{U}=\text{Br, I, Cl, or CN}$  and  $\text{R}_f$  is a perfluorinated  
divalent linking group optionally containing O atoms; or (b)  $\text{Y}(\text{CF}_2)_q\text{Y}$ , wherein: (i) Y is Br or  
30 I or Cl and (ii)  $q=1-6$ .
6. The compound according to claim 5, wherein said cure site moieties are derived from  $\text{CF}_2=\text{CFBr}$ ,  $\text{CF}_2=\text{CHBr}$ ,  $\text{ICF}_2\text{CF}_2\text{CF}_2\text{CF}_2\text{I}$ ,  $\text{CH}_2\text{I}_2$ ,  $\text{BrCF}_2\text{CF}_2\text{Br}$ ,  $\text{CF}_2=\text{CFO}(\text{CF}_2)_3-\text{OCF}_2\text{CF}_2$

Br,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{Br}$ ,  $\text{CH}_2=\text{CHCF}_2\text{CF}_2\text{Br}$ ,  $\text{CH}_2=\text{CHCF}_2\text{CF}_2\text{I}$ ,  $\text{CF}_2=\text{CFCI}$  or mixtures thereof.

5 7. The compound according to claim 5, wherein said iodine or said bromine or said chlorine are chemically bound to chain ends of component (a).

8. The compound according to claim 1, wherein said one or more perfluorinated ethers include  $\text{CF}_2=\text{CFOCF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{CF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{OCF}_2\text{CF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{OCF}_2\text{CF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{CF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{CF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{CF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2(\text{OCF}_2)_3\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2(\text{OCF}_2)_4\text{OCF}_3$ ,  $\text{CF}_2=\text{CFCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{OCF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{OCF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_3$ ,  $\text{CF}_2=\text{CFCF}_2\text{OCF}_2\text{OCF}_3$ , or combinations thereof.

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9. The compound according to claim 2, wherein said quadpolymer includes tetrafluoroethylene, vinylidene fluoride, a perfluorinated vinyl ether of the formula  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{CF}_2\text{OCF}_3$ , and a perfluoromethyl vinylether.

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10. The compound according to claim 1, wherein said component (a) is formed by emulsion polymerization.

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11. The compound according to claim 1, wherein said fillers include carbon black, graphite, thermoplastic fluoropolymer micropowders, clay, silica, talc, diatomaceous earth, barium sulfate, wollastonite, calcium carbonate, calcium fluoride, titanium oxide, iron oxide, or combinations thereof.

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12. The compound of claim 1, further comprising acid acceptors.

13. The compound of claim 12, wherein said acid acceptors include magnesium oxide, lead oxide, calcium oxide, calcium hydroxide, dibasic lead phosphite, zinc oxide, barium carbonate, strontium hydroxide, calcium carbonate, hydrotalcite, alkali stearates, magnesium oxalate, or combinations thereof.

14. The compound according to claim 1, wherein said compound has a solvent volume swell in FUEL K (CM85) of about 60% or less, according to ASTM D471-98.

15. The compound according to claim 1, wherein said curable component is peroxide curable.

16. The compound according to claim 1, wherein said one or more perfluorinated ethers corresponds to formula II and said curable component is a bisphenol curable compound.

17. A compound comprising:

(a) a terpolymer including interpolymerized units derived from vinylidene fluoride and one or more perfluorinated ethers of the formula:

$\text{CF}_2=\text{CFO}-(\text{CF}_2)_m-(\text{O}(\text{CF}_2)_p)_n-\text{OR}_f$  (Formula I) wherein  $\text{R}_f$  is a perfluorinated (C1 -C4)alkyl group,  $m=1-4$ ,  $n=0-6$ , and  $p=1-2$ , or

$\text{CF}_2=\text{CF}(\text{CF}_2)_m-\text{O}-\text{R}_f$  (Formula II) wherein:  $m=1-4$ ;  $\text{R}_f$  is a perfluorinated aliphatic group optionally containing O atoms; and

(b) a curable component including at least one filler having at least 10 parts per 100 parts of component (a), such that upon vulcanization the resulting compound has a Shore A hardness according to ASTM D2240-02 of 60 or greater, a TR-10 of  $-25^\circ\text{C}$  or less, and a permeation rate of 65 (g-mm/m<sup>2</sup>-day) or less.

18. A method of forming an elastomer, comprising vulcanizing a compound having:

(a) a copolymer including interpolymerized units derived from one or more perfluorinated ethers of the formula:

$\text{CF}_2=\text{CFO}-(\text{CF}_2)_m-(\text{O}(\text{CF}_2)_p)_n-\text{OR}_f$  (Formula I) wherein  $\text{R}_f$  is a perfluorinated (C1-C4) alkyl group,  $m=1-4$ ,  $n=0-6$ , and  $p=1-2$ , or

$\text{CF}_2=\text{CF}(\text{CF}_2)_m-\text{O}-\text{R}_f$  (Formula II) wherein:  $m=1-4$ ;  $\text{R}_f$  is a perfluorinated aliphatic group

optionally containing O atoms; and

(b) a curable component including at least one filler having at least 10 parts per 100 parts of component (a).

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19. The method of claim 18, wherein said elastomer has a Shore A hardness according to ASTM D2240-02 of 60 or greater, a TR-10 of  $-25^\circ\text{C}$  or less, and a permeation rate of 65 ( $\text{g}\cdot\text{mm}/\text{m}^2\cdot\text{day}$ ) or less.

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20. An article comprising a cured compound according to claim 1.

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